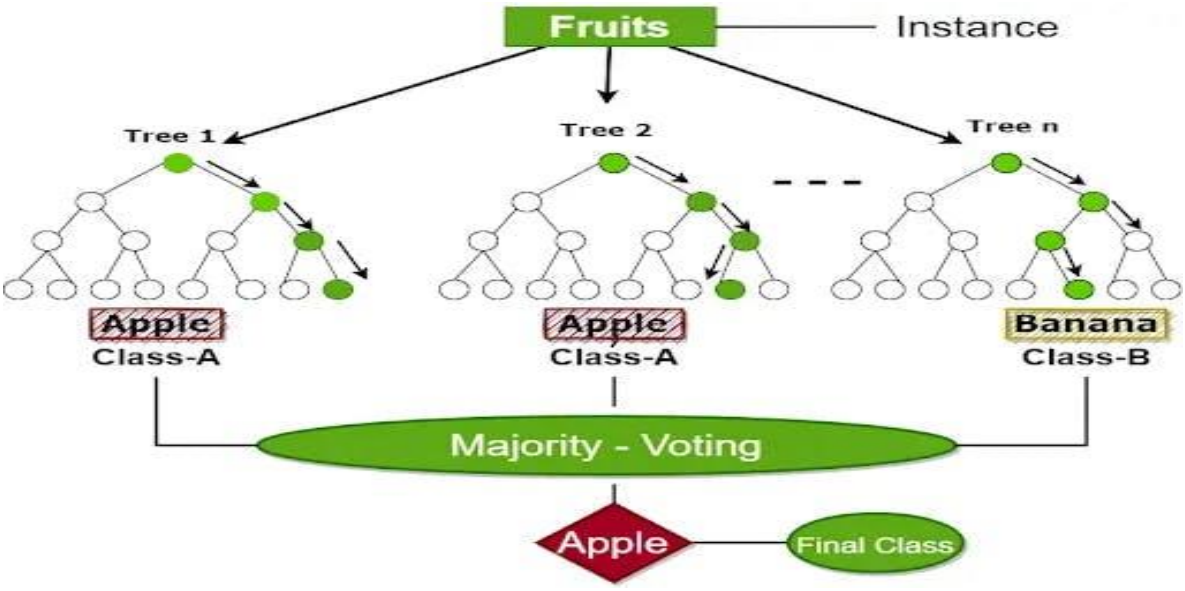
Supervised Learning Algorithms

- **Regression**

Random Forest :

Random Forest algorithm is a powerful tree learning technique in Machine Learning. It works by creating a number of Decision Trees during the training phase.

- ❖ Random forest or random decision forests is an ensemble learning method for classification, regression.
- ❖ Random decision forests correct decision tree habit of overfitting to their training set.
    1. Create Bootstrap Dataset from Original data by randomly choosing dada(repetition is allowed).
    2. Create Randomized Decision tree from Bootstrap dataset.
    3. Finally output of the random forests is the class selected by most trees.



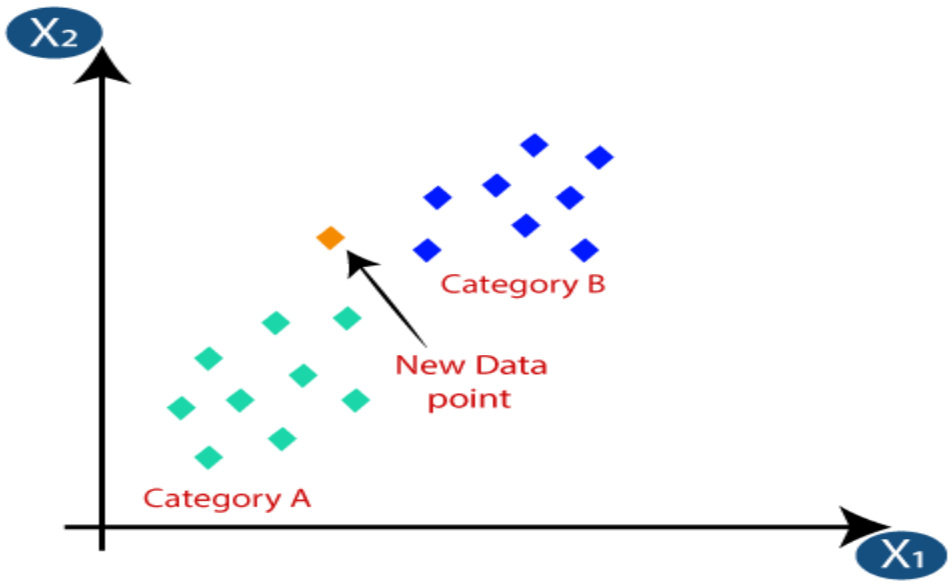
- # Classification

K-nearest neighbors algorithm(KNN) :

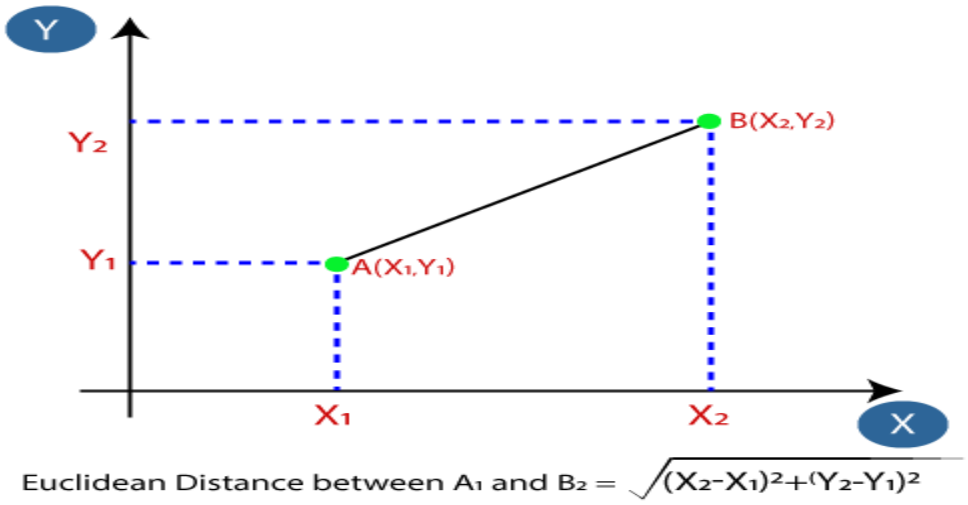
The KNN algorithm classifies a data point by finding its nearest neighbors and assigning it to the majority class of those neighbors.

- **Step-1:** Select the number K of the neighbors
- **Step-2:** Calculate the Euclidean distance of **K number of neighbors**
- **Step-3:** Take the K nearest neighbors as per the calculated Euclidean distance.
- **Step-4:** Among these k neighbors, count the number of the data points in each category.
- **Step-5:** Assign the new data points to that category for which the number of the neighbor is maximum.
- **Step-6:** Our model is ready.

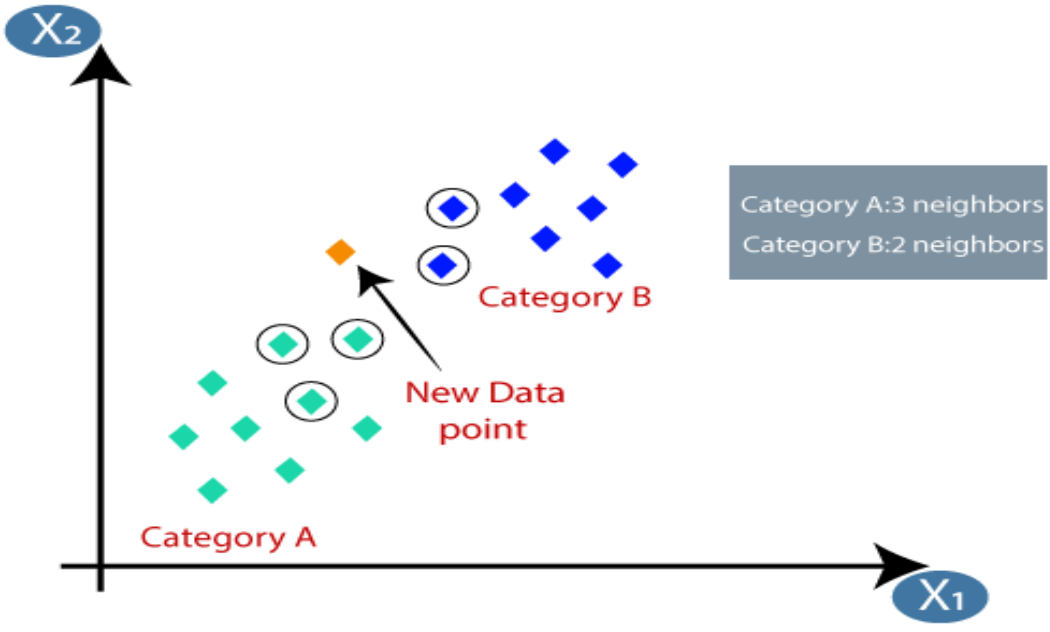
Suppose we have a new data point and we need to put it in the required category. Consider the below image:



- Firstly, we will choose the number of neighbors, so we will choose the k=5.
- Next, we will calculate the **Euclidean distance** between the data points. The Euclidean distance is the distance between two points, which we have already studied in geometry. It can be calculated as:



By calculating the Euclidean distance we got the nearest neighbors, as three nearest neighbors in category A and two nearest neighbors in category B. Consider the below image:



- As we can see the 3 nearest neighbors are from category A, hence this new data point must belong to category A.

Example:-